21. The people of the surrounding villages, Muhammadans and Hindus, depend on the forests only to a limited extent for fuel and grazing and small wood for building and agricultural purpose. Those most dependent on the forests are the maldars or professional cattle breeders who are permitted to squat in the forests on payment of grazing fees for their cattle. * Appendix J is a compilation of the orders regulating grazing and the conduct of maldars squatting in the forest. Forest cultivation is done to some extent, assessment being charged at the prevailing rates of ordinary Government land in the same taluka.

CHAPTER II.

THE COMPOSITION AND CONDITION OF THE FOREST.

1.—*Distribution and area.*

22. Nearly in every case the forests form independent blocks, and the total forest area is made up of 65 of these blocks distributed for the most part on and near the banks of the river; the others, constituting the dry forest, lying along the two sections of the railway running through the district. The following shows the distribution of the area according to ranges:—

No.	Range.	Acres.	guntas.
1	Kot Sultan	22,670	12
2	Sukkur	27,316	36
3	Abad	43,060	12
4	Kashmor	26,717	8
5	Mirpur	44,736	4
6	Ghotki	30,953	0
7	Sadhuja	73,814	4
	TOTAL	269,267	36

or 42·72 square miles.

23. With the exception of the first range which is made up of the forests situated along the railway between Shikarpur and Jacobabad, the other ranges are constituted of the river side forests with addition in the case of the last three ranges of the dry forests on the Rohri-Multan section of the North-Western Railway. The second, third and fourth ranges are on the right bank of the river in the order given from south northwards, and the last three ranges on the left bank of the river from north southwards.

24. The maps available are the deh or village maps of the revenue survey settlement on a scale of 8 inches to a mile; and the riverain survey sheet maps on a scale of one mile to an inch. The latter, however, are not complete for all the forests in the division.

25. The old forest maps which were in use were at fault in most cases, and did not agree with the deh maps prepared under the latest revision survey settlement. Much time and attention had, therefore, to be given to the elaboration of correct maps by actual survey and by correcting the boundaries where wrong so as to make them coincide with the deh maps. Fresh forest maps have been prepared on a scale of 4 inches to a mile, and the acreages of the forests have been scaled off the corrected maps by means of the planimeter. The forests are named from the dehs in which they are situated. Appendix A. gives details of the forests showing changes brought about by erosion, accretion and disforestment since they were reserved.

2.—*State of the boundaries.*

26. The forests are demarcated by lines cleared on the ground and by mounds of earth raised breast high, with a basal diameter of 7 ft. and having poles planted in the centre. Sometimes the mounds are surrounded by a

* Not printed.

shallow ditch with two short trenches cut radially to show the direction of boundary. Riverside forests have, of course, the river for a natural boundary on one side. Revenue lands inside forests are likewise similarly demarcated by cleared lines and mounds of earth, but very often this is not the case, especially of those lands which have lain fallow for one or more seasons. Boundary marks ought to be placed at intervals apart so that each mark may be visible from the next on either side. Revenue boundary marks of occupied lands inside forest which are under cultivation are usually kept up, but those of fallow lands are seldom recognisable. It is important, however, that the exact limits of these lands should be known to the Forest department, otherwise encroachments might occur and give rise to vexatious disputes.

27. The practice obtaining in the other forest divisions in Sind of dividing up the forests on a plan of squares or compartments of a quarter of a square mile and less in area by cross parallel lines or rides half a mile apart is observed here also. The lines are useful for the purposes of the inspection of the forests and the exploitation of the produce, but are valueless as firelines for the reasons that they are seldom wide enough and are not firetraced. Ordinary lines ought to be 25 ft. wide, and lines dividing working circles 50 ft. wide; and they ought invariably to be firetraced when there is danger in the presence of tall dense grass of fire occurring and spreading from compartment to compartment.

28. The work of keeping up the boundary lines and marks and the compartmemt lines or rides is done by the maldars under the supervision of the forest establishment.

3.—*Legal position.*

29. All the old forests were notified under section 34 of the Indian F[redacted] Act in 1878. Those old forests which are[redacted] ated on the banks of the river were th[redacted] shikarghas of the Mirs which became ced[redacted] the British with the Province of Sind, while the others on the Rohri-Mu[redacted]n section of the railway were originally fuel reserves of the Indus Valley Railway acquired in 1875 and placed in the protection of the Forest department.

Government notification No. 6487, dated the 17th December 1878.

30. In 1885, the fuel reserves of the Sind-Pishin State Railway between Shikarpur and Jacobabad, acquired in 1879, were settled and declared reserved forest under the Act. In 1886, 1887 and 1888 numbers of new forests on the North-Western Railway and elsewhere were notified under the settlement of Mr. Mules who was appointed Forest Settlement and Demarcation officer for the purpose of taking up additional areas of land for forest as the needs of Sind and Baluchistan were far beyond the existing supply and the old forests were being rapidly exhausted.

Government notification No. 2464, dated the 23rd March 1885.
Do. No. 6226, dated the 31st August 1886.
Do. No. 7250, dated the 13th October 1886.
Do. No. 358, dated the 15th January 1887.
Do. No. 1569, dated the 15th March 1887.
Government notifications No. 2552, 2553-A and 2554, dated the 26th April 1887.
Government notification No. 8027, dated the 18th November 1887.
Do. No. 5787, dated the 27th August 1888.

31. In 1894, the Deputy Conservator represented to the Commissioner in Sind that the orders contained in the latter's Special Circulars of 1890, appendix K, were resulting in the grave diminution of old forest areas, and in 1895 and 1896 nearly all the forests in Kashmor range and several forests in Mirpur and Ghotki ranges were newly acquired.

Government notification No. 2405, dated the 25th March 1895.
Do. No. 3958, dated the 27th May 1895.
Do. No. 9253-A, dated the 23rd November 1895.
Do. 6226, dated the 31st August 1896.

32. Under the Commissioner in Sind's orders *kacha* or new lands thrown up by the river in front of existing reserves have been acquired and added to existing areas. The legal position of these is not quite clear, since the rules under which they were enforested have not been declared to have the force of law, as have been the general rules regarding alluvion and dilluvion determining the proprietory rights of private individuals as against Government.

It would be, perhaps, well to bring these *kachā* areas under the Forest Act by notification after they became permanently part of the forests to which they are attached.

4.—*Rights and concessions.*

33.—These are recorded in appendices E, E¹ and E².

5.—*Composition and condition of the crops.*

34. The crops are composed of the four principal species of tree-growth common to Sind. Bābul, *bahan* and *lai* thrive on riverside lands which receive the yearly flood, and *kandi* stands apart on high alluvion constituting the principal crop of the dry forests.

35. Babul (*acacia arabica*) on the whole is not plentiful. It is beset with enemies on all sides. Grown in the open, it yields to the effect of frost and dies early. Its natural nursery is the newly raised *kacha* covered with immature *lai* which shelters the young plant and draws it up towards light and air. By the time it is grown to overtop its nurse it is strong enough to withstand the severity of winter. But *lai* is often associated with *kanh* grass (*saccharum spontaneum*) on the *kacha* and fires are rife, resulting in complete holocausts of young babul. Consequently in the mature state babul is never found covering large areas as in Lower Sind : it stands scattered or mixed with *bahan*, and parts and patches which have been favoured by regular floods, and escape from fire, alone remain stocked with unmixed babul As the river recedes and inundation fails babul dies out and gives place to *kandi*, and in this condition it is only to be seen in narrow belts or strips overhanging dhands, [illegible]as and other depressions which continue to receive water in their channels. [illegible]bul area felled over is never regenerated with babul ; if seedlings appear [illegible]are killed by frost, and coppice is but too rarely seen.

36. *Bahan* (*populus euphratica*) is said to be in its natural habitat in t[illegible] part of Sind, but, as a matter of fact, it is no more plentiful here than in other riverside forests extending down to Hyderabad. As elsewhere in Sind it springs up spontaneously in the *kachas*, or mud flats of the river and like babul is subject to fires where *kanh* grass abounds. It lasts longer than babul in the absence of water and may be seen standing in forests long after babul has quite gone out. It reproduces well by coppice shoots and root suckers and continues to do well as long as it can draw on the store of nourishment in the sub-soil.

37. *Lai* (*tamarix gallica* and *tamarix dioica*) occurs more largely than any of the other three species. It flourishes on the banks of the river and sometimes forms dense unmixed crops in silted depressions of old river channels. It originates on *kachas* and depends on river irrigation for success, but continues to stand as a low bushy scrub even on *kalar* soil until the sub-soil moisture drawn to the surface is finally evaporated. *Asri* (*tamarix orientalis* is sometimes associated with *lai* in favoured localities. It is superior to *lai* and attains good height and diameter measurements under suitable conditions of soil and water.

38. *Kandi* (*prosopis spicigura*) is the hardy species of the dry forests. Without being called a desert species, it continues to grow after the other principal species have failed, but is not insensible to the special advantage of surface irrigation. The life of a *kandi* forest can be prolonged to an extraordinary length of time by coppice on acconnt of its deep root-stock which keeps up its vitality until it is finally exhausted with the exhaustion of the sub-soil nourishment on which it depends. It rapidly dies out, however, on a sandy sub-soil, and ceases to stand on any soil which is heavily impregnated with *kalar* salts.

39. The condition and density of the crops vary in different forests and in different parts of the same forest, and are directly proportional to the degree of watering received by a given area. Even the riverain forests are not always wholly flooded and those remote from the river get hardly any water at all.

As a rule, the forests on the banks of the river continue to receive the benefit of the yearly floods until the surface level of their areas is raised by successive deposits of silt above the level of ordinary floods; thereafter, irrigation depends only on abnormal floods until it ceases altogether. Forests not actually on the banks of the river are watered by *purans* or dhands, as the Kalo Dhand in Kashmor range, the Fatehpur Dhand in Mirpur range and the Jano Dhand in Sadhuja range, which are all abandoned channels of the river in process of being silted up. The remote or inland forests are irrigated only to the extent that flood water passes in dhoras and shallow depressions when inundation is very high.

40. The river channel is not persistent throughout a succession of years Owing to the large amount of material brought down by the river the bed of the channel is being constantly raised giving rise to erosion on the banks. Erosion is most active on those banks in which a light sandy alluvium prevails, and this alluvium lends itself so readily to the scouring action of the river that the latter's course is often diverted for a considerable distance from its former channel which then becomes a wahur, puran or dhand All the forests on the banks of the river have undergone and still undergo changes in this way, so that their acreages are never the same for even two years in succession.

41. Irrigational works carried out by the Public Works Department to benefit cultivation, do much harm to the forests by altering the face of the country subject to natural irrigation. Bands and canals intervene and shut off river water from parts of the country which would be otherwise flooded. The Sukkur-Kashmor band extending the whole way from Sukkur to Kashmor on the right bank of the river makes it impossible for river water to reach the forests in Kot Sultan range; and the several canals with their accompany spoil banks on the left bank of the river intercept the floods which used pass down from the Fatehpur dhand and the Bhawalpur State on the north a from Jahanpur and Tando Nijabat in Ghotki taluka on the west and fre irrigate immense areas on the east and south as far as Rohri. The present d forests of Mirpur, Ghotki, Sadhuja and Kote Sultan ranges flourished under the influence of these floods from 15 to 25 years ago whereas now many of them are so exhausted that they are mere dust heaps and *kalar* wastes, wholly unproductive and unfit for forest.

42. It is intended by these remarks to show not only that the Public Works Department ought in certain cases to make good from canals the flood water that they cut off from forests, but also that forests which are cut off from the river and exhausted ought to be disforested, and additional areas of land acquired in their place on the banks of the river. Bands constructed across forests ought to have flood-ways left in them as liberally as possible so as to give the protected side every opportunity of keeping up its reproductive power as long as possible. Canals cut through forest ought to have sluices opened in their banks so that the land on each side may be benefited by the spill. The forests in Kot Sultan range, Lakhi Garhi Halim and Bagarji forests in Sukkur range, and Mohro-Mari forest in Abad range ought all to be irrigated by canal water if they are to grow fuel for the railway and Baluchistan. In fact the permanent maintenance by artificial irrigation of fuel reserves close to the frontier where wood is scarce ought to be a matter of imperial interest, and advantage ought to be taken of the several large canals flowing westwards from the river to grow forests on suitable irrigable areas on their banks. For forests elsewhere the proper sylvicultural treatment is to grow them on the banks of the river where they can be naturally flooded. Nature shows that when the river recedes the soil becomes exhausted after a time and forests die out, their place being taken by other forests growing on new lands thrown up by the river. This report has nothing whatever to do with the question of acquiring new land, it is amply dealt with in the Commissioner in Sind's orders (*vide* appendix K) which need only to be carried out in the same liberal spirit in which they are worded. This, however, is certain that if supplies of forest produce and forest pasture are to continue in undiminished

quantities, suitable areas of land on the banks of the river to grow forest produce, etc., must be made available from time to time in place of old unreproductive areas which ought to be disforested.

6.—Injuries to which the crops are liable.

43. The injurious effects of river changes and of frost have been explained. Fires are prevalent where grass abounds and cause immense destruction of the crops, young and old. *Kanh* (*saccharum spontaneum*) is the grass of riverside forests and *sar* (*saccharum arundinaceum*) of dry forests, and each growing dense attains a height of from 10 to 12 ft. and more. Maldars are the principal offenders in causing fires in forest and their object is to stimulate the growth of fresh grass after the stubble has become too coarse for the cattle to eat. Fires in railway-side forests are attributed to sparks from passing locomotives, but here, too, fully 90 per cent. of the occurrences have their origin in incendiarism. Malice and mischief following on cattle-seizure and impounding are often actuating cause of fires.

44. Reproduction is much impeded by illicit grazing and browsing. Regeneration-closures very often exist only on paper; on the ground a closure may be defined to be an area strongly fenced in all round with two or three gaps open on each side for cattle to pass in and out. The gaps are closed for the benefit of the supervising officers' inspection and opened as soon as it is over. Areas closed for reproduction become cattle-runs for "gormal,' that is, cattle which live and breed in forest and have, to a certain extent, lost instinct of domestication but are not ownerless. Forests closed to browsers are closed only to the extent that fees are not credited to Government, the condition of the young growth, argues nevertheless that browsers have been admitted. Many of the *kandi* forests in the division owe their ill-condition to the ravages committed by camels and goats, particularly by the latter. Serious damage to forest growth is also caused by herdsmen in charge of horned-cattle and goats who lop off branches of big trees—babul for choice and cut down saplings so that the animals may feed on the leaves and tender shoots.

45. As minor causes of injury may be mentioned, gall flies which lay their eggs in the terminal branches of *kandi* causing the parts to swell out, the branches eventually withering and falling off. Rats are very destructive to young babul and *kandi* which they gnaw just below the surface of the ground. Their ravages are most marked in seasons of low inundation when they become very numerous.

CHAPTER III.

SYSTEM OF MANAGEMENT.

1.—Past and present systems of management.

46. Nothing is known of the system of management that was applied to the forests after they came into the hands of the British with the conquest of the Province until 1860-61, from which year Forest Administration Reports are available. All the forests then were old shikargas of the Mirs which had been conserved principally in the interest of game and from which all rights and privileges of the people had been rigidly excluded. From 1860-61 to 1871-72, the management was mainly concerned with the supply of wood fuel to the Indus Flotilla Company which carried on business between Sind and the Panjab. The felling and conversion of the wood and its carriage to the banks of the river were done by contract agency, and the company was charged at the rate of Rs. 18-8-0 (reduced to Rs. 16 in 1869-70) per 100 maunds. Firewood was sold at the depôt in Sukkur and was also permitted to be removed from forests for local consumption on payment of permit fees. Timber was extracted by approved purchasers on payment of fees, and beams and rafters of babul and *bahan* were brought to the depôt at Sukkur and auctioned from time to time.